Abstracts

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How Cropping and Farming System Modelling Can Help the Extension of Conservation Agriculture? Case study in Madagascar

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Conservation agriculture and DMC technique is a real alternative in some areas of Madagascar for poverty alleviation and a potential issue for local farmers to overcome climatic and economic risks. Local development projects such as BV-lac in the Lake Alaotra region promote such systems according to local constraints. These days, *i.e.* 2007-08 cropping season, around 2000 farmers are practising CA cropping system based on 1) no till, 2) permanent organic cover, and 3) rotation including cover crops. The BV-lac project is currently trying to extend the first experimental action to a significant level, trying to enhance extension in quantity and also in quality. One of the major steps to complete this goal is to ensure that technical recommendations match farm structure and fit smallholder' strategies, constraints and objectives. To tackle such a challenge, we propose an approach including modelling at both cropping and farming systems. The paper aimed at presenting this approach, the modelling tools and the effective use of such tools with local development partners. Within the modelling tools there are three softwares : the couple of software PRACT/ GANESH (K Naudin/SCRID) to select cropping patterns and their integration into farming systems and farming system modelling with the tool OLYMPE (Attonaty, INRA-CIRAD-IAMM). This last one is used in farming systems monitoring network. The PRACT/GANESH tools are still under construct. There are both Decision Support Systems (DSS). PRACT (Prototyping Rotation and Association with Cover crop and no Till) is a tool to generate and to evaluate crop rotations and crop sequences in DMC systems at field level. The second DSS named GANESH (Goals oriented Approach to use No till for a better Economic and environmental sustainability for SmallHolders) is at farm level and uses linear programming to optimize the cropping plan to be proposed to farmers. Olympe is an economic modelling tool on farming simulation to help individual decision-making at farm level and may be used for project to identify technologies adapted to farmers' types. Positive or negative externalities can also be integrated. Farming system modelling associated with a farm typology can therefore be used to help projects as well to test scenarios with various types of technologies in order to assess what is the right technology with the right farmer at the right time. Then, it aims to provide guidelines for agricultural and development policies for institutions or donors. Both tools should enable projects partners to measure the real impact of technological and organizational changes through prospective analysis and feedback from farmers through innovation process identification.

Participatory Research: A Farmer-centered Approach for Varietal Development in Sodic Soils

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Although, germplasm can be developed at national and international levels to incorporate a number of genetically useful trails, it is a major challenge for scientists with limited resources to test the full range of genetic diversity generated by a breeding programme under all possible environments. There are a large number of rice genotypes that are grown from coastal to inland and saline to sodic ecosystems. Genotypes suitable for coastal areas may or may not be suitable for inland areas. The same could be the case of adaptability of genotype in saline and sodic environments. Since, the ecology of the salt-affected environments differs from one target area to another, it is imperative to develop cultivars which are specific to the target environment and meet the plant type requirements. The farmers continue

cultivation of traditional low yield rice varieties due to non-availability of improved varieties to the salt-stress and associated complexities.

Participatory variety selection (PVC) trials were conducted under IRRI managed Challenge Program on Water and Food (CPWF) collaborative project 7 (PN7) in Unnao district of Uttar Pradesh during 2004-05 on sodic soil characterized by 47% sand, 21% silt and 32% clay, pH 10.30, EC 11.5 dS m^{-1} and organic carbon 0.10 g kg^{-1} while other was reclaimed sodic soil with pH 9.2 and EC 0.68 dS m^{-1} . Farmers were involved from the beginning throughout entire crop management and the varieties were got evaluated through farmer's participation and preference analysis. Seven most promising salt-tolerant varieties /genotypes developed by rice breeding program of CSSRI, Karnal viz. CSR-2K-219, CSR-2K-262, CSR-89IR-8, CSR 23, CSR27, CSR30 (Basmati type) and CSR 36 were grown each in a 6.00 m^2 plot to elicit farmer's response. Though farmers regularly visited the sites but at the time of maturity, they were asked to rank the varieties based on their liking on various traits like plant height, flowering duration, grain type, and many other growth and yield attributing traits. The independent choice of each of the farmers was ascertained through secrete balloting. The farmers given ranks were compiled for deciding the choice of farmers on 1st, 2nd, and 3rd positions in sodic environments. The genotypes CSR-89IR-8, CSR-2K-219 and CSR-2K-262 were ranked as 1st, 2nd and 3rd with an average yields 4.51, 4.40 and 4.22 t ha^{-1}, respectively. During 2005-06, these trials with 2 new genotypes like CSR-2K-239 and CSR-2K-228 were again conducted at the same sites. On overall basis, CSR-89IR-8 secured first rank again due to its early maturity, grain quality and grain yield. Due to early maturity and good grain quality, farmers' preference for the genotype has increased remarkably. More and more farmers hve come forward to get seed of this genotype. During 2007-08, the genotypes has spread to about 40 farmers through inter-farmer seed dissemination method. Further up-scaling of the genotype is being done through more demonstration trials being conducted by the nearly Farm Science Centre (Krishi Vigyan Kendra), located in Dhaura, Uttar Pradesh which facilitates the dissemination of the sodic land reclamation technologies.

Applied Down-Well Camera Technology: Inspecting Water Wells

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Groundwater can be vulnerable to contamination especially in Karst terrain and in unconfined sand aquifers. Middle Tennessee (United States of America) has an abundance of limestone rocks that tend to form terrains referred to as Karst is characterized by sinkholes and disappearing streams and caves, which could serve as conduits to contaminants because of their rapid groundwater flow, especially in recharge conditions such as storm events. The protection of groundwater from contamination continues to pose a major challenge, for it impacts source and quality of drinking water.

Down-well camera technology has been used to inspect water wells for potential problems associated with improper well construction and/or maintenance, and to highlight the overall integrity of the wells. The goal of this study was to capture film footage by this technology in two water wells located in the Middle Tennessee countries of Davidson and Cheatham. Davidson county well was located on Tennessee State University (USA) Agricultural Research Farm, whereas the Cheatham county well was on a private land-owner's farm. According to the Karst areas map of Tennessee Davidson and Cheatham counties have 0 to <1% sinkholes, respectively.

No evidence of leaks through the casing or casing joints was observed in either of the wells. However, visual evidence of extensive fractures and dissolution channels within the sedimentary rock aquifer was noted during the video inspections of the open bore-hole. Due to the extensive fracturing observed, it would be rational to assume that the potential for seeping contaminants exists. Abundance of particulate matter was also evident on the film, which could be an indication of a biologically active ground water, or of other chemotropic matter dissolved from soil minerals, or both. Live fish were observed swimming in the Davidson county well at depths of 32.1 and 68.3 feet. They were tentatively identified as the Southern Cavefish (*Typhlichthys subterraneus*).